LIQUID INJECTION ADAPTOR

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 247,207, filed Apr. 24, 1972 and application Ser. No. 266,393 filed June 26, 1972, now U.S. Pat. No. 3,743,187. Application Ser. No. 247,207 is a division of application Ser. No. 7747, filed Feb. 2, 1970, now U.S. Pat. No. 3,692,243, and application Ser. No. 266,393 is a continuation of application Ser. No. 77,880, filed Oct. 5, 1970, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a liquid injection adaptor and, more particularly, to a liquid injection adaptor used in conjunction with nozzles for "cement guns" used in handling cementitious materials.

During the passage of dry cementitious materials pneumatically blown through a cement gun discharge nozzle, water is introduced transversely into the stream of dry material and mixed therewith to form a wet cementitious material which issues through the nozzle as a high velocity stream to be directed upon a background surface. Often, the means for introducing the liquid into the stream of dry material comprises an adaptor connected to the inlet end of the nozzle and interposed between the latter and a hose coupling connected to a conduit for conveying the dry material from a suitable source. Generally, the adaptor is provided with an annular manifold connected to a liquid inlet and communicating with radial passage means extending circumferentially about the adaptor bore for injecting the liquid radially under pressure into the stream of dry material. The dry material should be uniformly wetted throughout in order to obtain an optimum mix. However, a problem sometimes arises in uniformly wetting the dry material because of the varying flow of liquid through the radial passage means. Also, axial misalignment of the coupling relative to the adaptor can vary the flow of liquid injected into the stream of dry material.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved liquid injection adaptor having novel liquid flow control means to insure uniform wetting of the dry materials passing through the adaptor.

It is another object of this invention to provide the foregoing liquid injection adaptor with means centering the associated coupling relative to the adaptor.

The liquid injection adaptor of the present invention is characterized by the provision of an annular manifold groove of progressively diminishing depth to insure a uniform flow of liquid therefrom through radial passages into a stream of dry material for uniformly wetting the latter. A series of equally and circumferentially spaced ribs formed on and integral with an annular shoulder on the adaptor are engagable with the outer beveled surface of a coupling member to positively center the coupling member relative to the adaptor further facilitating uniform liquid flow into the path of the dry material.

The foregoing and other objects, advantages and characterizing features of the present invention will become clearly apparent from the ensuing detailed description of an illustrative embodiment thereof, taken together with the accompanying drawings wherein like reference characters denote like parts throughout the various views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a liquid injection adaptor of the present invention, shown mounted between a nozzle and a material conveying conduit;

FIG. 2 is an end view, on an enlarged scale thereof, looking in the direction of arrows 2—2 in FIG. 1;

FIG. 3 is a longitudinal sectional view, on an enlarged scale, taken about on line 3—3 of FIG. 1, an end portion of the nozzle being broken away for ease of illustration;

FIG. 4 is a fragmentary sectional view, on an enlarged scale, taken about on line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary sectional view, on an enlarged scale, showing a hose coupling connected to the inlet end of the adaptor of FIG. 3.

DETAILED DESCRIPTION OF AN ILLUSTRATIVE EMBODIMENT

Referring now in detail to the illustrative embodiment depicted in the drawings, there is shown in FIG. 1 a liquid injection adaptor, generally designated **10**, constructed in accordance with this invention, and shown attached at one axial end thereof to a hose coupling **12** and attached at the other axial end thereof to a nozzle **14**. Hose coupling **12** is connected to a conduit **16** through which dry cement ingredients from a suitable source (not shown) are conveyed by a blower (also not shown) in a manner known in the art. Such material is forced under pressure through conduit **16**, hose coupling **12**, adaptor **10**, and into and through nozzle **14**. Liquid, usually water, is added to the dry material by means of a pipe **18** connected into adaptor **10**. The dry material and water are intermixed to produce a wet cementitious material which is directed through nozzle **14** and outwardly therefrom onto the desired surface.

As shown in FIG. 3, nozzle **14** comprises an elongated hollow body **20** formed of a suitable elastomeric material and having a generally cylindrical outline but slightly tapered toward the discharge end. Body **20** is provided with an inlet end **24** and an outlet end **26** (FIG. 1), the inlet end **24** being externally threaded as at **28** for threaded engagement with adaptor **10**. Two pairs of diametrically opposed lugs **30** and **32** are formed on the outer surface of nozzle **14**, integral therewith, for facilitating the grasping and handling of nozzle **14**.

Nozzle **14** is provided with an axial bore, generally designated **34**, having a first chamber **36** at the inlet end **24**, an elongated, intermediate mixing chamber **38**, and an outlet chamber (not shown). Bore **34** tapers uniformly from the inner end of chamber **36** to the outer end of the outlet chamber. This gradual taper tends to choke the cementitious mix as it is conveyed outwardly through nozzle **14** to minimize spreading of such mix and to constrain the projecting stream within the desired path.

A double helical thread formation, generally designated **40**, defines the inner wall surface of mixing chamber **38** to effect a thorough mixing of the mix passing through bore **34**. Each helix formation **40** comprises a projection **42** and a groove **43** separated by a curved, sloping shoulder **44**. Projection **42** is provided